and GDP-4-keto-6-deoxy-D-mannose-4-aminotransferase (rfbE) activity, and

b. isolating said GDP-6-deoxyhexose.

15. The process of claim 14, wherein said GDP-6-deoxyhexose is selected from the group consisting of GDP-4-keto-6-deoxy-D-mannose, GDP-L-fucose and GDP-D-perosamine and wherein said starting substance is GDP-D-mannose.

16. The process of claim 14, wherein said enzyme has GDP-D-mannose-4,6-dehydratase (gmd, rfbD) activity and GDP-4-keto-6-deoxy-D-mannose-3,5-epimerase-4-reductase (wcaG) activity.

17. The process of claim 14, wherein said enzyme has GDP-D-mannose-4,6-dehydratase (gmd, rfbD) activity and GDP-4-keto-6-deoxy-D-mannose-4-aminotransferase (rfbE) activity.

18. The process of claim 14, wherein said enzyme is obtained by cloning a gene coding for said enzyme, inserting said gene into a vector, transforming said vector into a host cell, overexpressing said enzyme and isolating said enzyme.

19. The process of claim 18, wherein said gene is amplified prior to said cloning.

20. The process of claim 18, wherein said gene is selected from the group consisting of *manB*, *manC*, *gmd*, *rfbD*, *rfbE* and *wcaG*.

21. The process of claim 18, wherein said host cell is selected from the group consisting of *E. coli*, *Bacillus subtilis*, *Corynebacterium sp.*, *Staphylococcus carnosus*, *Streptomyces lividans*, *Saccharomyces cerevisiae*, *Schizosaccaramyces pombe*, *Hansenula polymorpha*, and *Pichia stipidis*.

22. The process of claim 14, wherein said GDP-6-deoxyhexose is selected from the group consisting of GDP-D-mannose and secondary products thereof, said starting substance comprises D-mannose-6-phosphate and guanosine triphosphate (GTP), and said enzyme comprises phosphomannomutase (manB) and GDP-D-mannose

synthase (manC).

23. The process of claim 18, wherein said process is carried out as a batch process.

24. The process of claim 18, wherein said process is carried out continuously in an enzyme-membrane reactor.

25. The process of claim 18, wherein said enzyme is immobilized on a solid support and wherein a buffer solution comprising said starting substance is continuously percolated thereover.

26. A process for the in vivo production of a fucosylated end product comprising:

a. cloning a gene coding for a protein having wcaG activity, transforming said gene into a host cell and overexpressing said wcaG in said host cell,

b. incubating intracellularly the wcaG produced in step a with GDP-4-keto-6-deoxy-D-mannose and $NADPH_2$ to produce GDP-L-fucose, and

c. transferring intracellularly the GDP-L-fucose produced in step b onto a substrate selected from the group consisting of glucosides, oligosaccharides and polysaccharides with the aid of a fucosyltransferase to form said fucosylated end product.

27. A process for the in vivo production of a perosaminylated end product comprising:

a. cloning a gene coding for a protein having rfbE activity, transforming said gene into a host cell and overexpressing said rfbE in said host cell,

b. incubating intracellularly the rfbE produced in step a with GDP-4-keto-6-deoxy-D-mannose and L-glutamate to produce GDP-D-perosamine, and

c. transferring intracellularly the GDP-D-perosamine produced in step b onto a substrate selected from the group consisting of glucosides, oligosaccharides and polysaccharides with the aid of a perosaminyltransferase to form said

perosaminylated end product.

28. The process of claim 26, wherein said protein having activity is derived from an organism selected from the group consisting of *Yersinia enterocolitica* and *Escherichia coli*.

29. The process of claim 27, wherein said protein having activity is derived from *Vibrio cholerae* 01.

30. The process of claim 26 or 27, wherein said host cell is selected from the group consisting of *Escherichia coli*, *Streptomyces sp.* and *Saccharomyces cerevisiae*.

31. A process for the production of GDP-D-mannose comprising:

a. incubating D-mannose-6-phosphate and GTP with enzymes having manB and manC activity, wherein said enzymes are produced by cloning genes coding for manB and manC, transforming said genes into a host cell, overexpression of manB and manC in said host cell and isolation of said enzymes, and

b. isolating said GDP-D-mannose.

32. A process for the production of GDP-4-keto-6-deoxy-D-mannose comprising:

a. incubating GDP-D-mannose with an enzyme having activity selected from the group consisting of gmd and rfbD, wherein said enzyme is produced by cloning a gene coding for said activity, transforming said gene into a host cell, overexpression of said activity in said host cell and isolation of said enzyme, and

b. isolating said GDP-4-keto-6-deoxy-D-mannose.

33. A process for the production of GDP-L-fucose comprising:

a. incubating GDP-4-keto-6-deoxy-D-mannose and $NADPH_2$ with an enzyme having wcaG activity, wherein said enzyme is produced by cloning a gene

coding for said wcaG, transforming said gene into a host cell, overexpression of said wcaG in said host cell and isolation of said enzyme, and

b. isolating said GDP-L-fucose.

34. A process for the production of GDP-D-perosamine comprising:

a. incubating GDP-4-keto-6-deoxy-D-mannose and L-glutamate with an enzyme having rfbE activity, wherein said enzyme is produced by cloning a gene coding for said rfbE, transforming said gene into a host cell, overexpression of said rfbE in said host cell and isolation of said enzyme, and

b. isolating said GDP-D-perosamine.

35. The process of any of claims 31-34, wherein said enzyme is immobilized on a solid support.

Respectfully submitted,

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